

The Aeta-Pinatubo loop

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The impact of Mount Pinatubo's 1991 eruption on the traditional use of natural resources by the indigenous Aeta was devastating. The damage resulted in the immediate and sustained disconnection of traditional knowledge from the biological resources integral to practice that knowledge. The relatively slow ecosystem recovery a full 20 y after the event hinders the transfer of traditional knowledge to younger generations of Aeta. Their traditional knowledge is at risk of disappearing from the cultural fabric of the Philippines. In seeking to adapt, decisions by the Aeta to accept the development of foreign-designed ecotourism enterprises may negatively affect natural ecosystem recovery. Alternatives to the existing ecotourism practices may be warranted to safeguard Aeta traditional knowledge.

Introduction

The eruption of Mount Pinatubo and the lahars that followed devastated the Aeta people, an ethnic group whose culture is based on the mountain.^{1,2} The Aeta were once exclusively hunters and food gatherers, surviving by means of extensive use of the Pinatubo vegetation.³ More recently, but prior to the eruption, they relied on shifting cultivation and food gatherer systems,¹ retaining a strict dependency on access to natural resources of the mountain.

I recently conducted extensive field work in the Mount Pinatubo habitats to quantify primary succession dynamics following the 1991 eruption.⁴ Two riparian systems on the east flanks of Mount Pinatubo were selected for this research, in part because the ecological recovery

in the riparian corridors is critical for sustaining the traditional culture of the Aeta people.³ Safeguarding traditional knowledge requires a contextual framework that enables the experiential passing of that knowledge from one generation to the next. Here I use my field experiences to discuss the connectivity of the Aeta and ongoing ecosystem recovery.

Eruption Influences Aeta Culture

Many of the plant species I cataloged⁴ are used by the Aeta tribe for medicinal, utilitarian or spiritual purposes.^{1,3} Our understanding of how the loss of access to the full suite of biological resources affected the general well-being of the Aeta is inadequate. Physical separation from the land began with evacuation prior to and resettlement after the eruption.^{2,5} Mount Pinatubo is the foundation of their identity, and the physical removal from this mountain was unacceptable for many of the Aeta who rapidly returned to Mount Pinatubo after temporarily living in government-prescribed camps.⁶

The slow recovery of the post eruption habitat does not present the condition or range of biological resources traditionally exploited by the Aeta. For example, the shifting soil must stabilize before reestablishment of pre-eruption plant communities can occur. In lahar depositional landscapes, a mosaic of healthy vegetation must develop to effectively reset streams and rivers terminate the chronic shifting and braiding that is now occurring.⁷ Stable river channels must develop before fish and other aquatic resources can return. This process is still in its infancy even 20 y after the eruption.

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Figure 1. Horses are used in ecotourism activities to carry tourists to the Mount Pinatubo caldera rim (top). These alien herbivores may be influencing invasive plant expansion by vectoring seeds to these remote habitats. Aeta woman prepares wild-harvested *Thysanolaena maxima* panicles for sale (bottom). The opportunistic harvesting of these panicles in Mount Pinatubo habitats under pressure from human traffic may explain spatial patterns of this large grass.

The exploitation of biological resources in Pinatubo rivers historically employed many approaches, with some methods and tools designed for individuals, others for small family units, and yet others for many members of a camp.³ These unique approaches to harvesting fish and other aquatic resources represents one example of traditional knowledge that may not be fully passed on to the younger generations if the traditional knowledge holders continue to be denied access to healthy fish populations.

Aeta Reaction Influences Primary Succession

An obvious example of how the Aeta people have directly influenced primary succession is their acceptance of foreign investments to initiate ecotourism operations. These investors and the nature-based tourism activities they have developed are diverse. The developments have embraced cooperation with the Aeta and the companies have helped the economy of the residents by creating jobs.

However, the activities that occur during operations of these tourism companies have the potential to limit the natural successional processes of the surrounding forests. The most easily perceived impact is the prevalence of weedy invasive species in high traffic corridors. Indeed, I quantified greater exotic vine species richness in the Sacobia River where daily tourist activity occurs than in the Pasig-Potrero River where no ecotourism experience has been developed.⁴

A second example is the use of exotic species for landscaping areas of the caldera in order to “beautify” these areas for tourists. This practice increases the risk of naturalized exotic species, and can further delay the reestablishment of native forests critical to maintaining the Aeta’s traditional knowledge and use of the land. A third example is the use of horses (*Equus ferus*) to carry tourists from jeep drop-off points to the caldera rim. Horses are seed vectors via endozoochory, aiding in the spread of weedy species^{8,9} throughout the remote terrain they traverse.

The absence of *Thysanolaena maxima* from Sacobia River plots⁴ is a probable function of localized chronic human travel and access. The panicles of this species are prized for making high quality brooms. Aeta families sometimes include this species in their shifting cultivation plots due to value of the panicles on the market.¹ Since harvesting *Thysanolaena* panicles is predominantly opportunistic in contemporary times, I believe former Sacobia River *Thysanolaena* plants rarely dispersed seeds prior to being harvested. Thus, recruitment of *Thysanolaena* in the Sacobia River system may have been hindered in recent years due to the chronic human traffic (Fig. 1).

One positive influence of Aeta involvement in primary succession deserves mentioning. Botanical research in the Philippines is difficult due to the daunting process required to acquire collection permits. Access to Aeta informants was mandatory for successful identification of the taxa that define the initial assembly of vegetation.⁴ Of particular relevance was the experience where the only informant in the barangay who possessed the knowledge of the Aeta name for several rare taxa was an elderly woman who had

been trained in medicinal plant use prior to the eruption.

Conclusions

The eruption of Mount Pinatubo set in motion a set of events that focused on protection of human life, and issues such as cultural needs and ecosystem recovery have been pushed into the background. Each passing year puts the Aeta traditional knowledge base at risk of permanent loss. Ethnobiology studies designed to identify distinctive traditional approaches to using Pinatubo's biological resources may be warranted to preserve Aeta cultural identity and to safeguard this knowledge base. Mount Pinatubo provides an example where the study of ecosystem recovery will benefit from a more inclusive set of values and concerns for a socially oriented approach, as advocated by Bawa et al.¹⁰ The need to intervene to safeguard Aeta traditional knowledge and culture also comes with the need to use ecological ethics.¹¹ Considering the need to align protection of intellectual property rights and biodiversity with national and international conventions,¹² local biologists would do well to take the lead in these efforts.

Ecotourism operations have created jobs and provided many Aeta residents a means of remaining connected to their environment. However, the development of these operations focusing on satisfaction of foreigners has not been universally

positive for the surrounding environment. The introduction and spread of exotic species due to the volume of tourists is perhaps the most easily quantifiable detrimental consequence. Establishing protected areas is sometimes the most appropriate approach for forest conservation, and in the Philippines this approach arguably works well in islands where population and political pressures are moderate.¹³ But setting aside protected areas may have little utility in a highly exploited and heavily trafficked habitat such as the recovering environment of Mount Pinatubo. Therefore, conservation through appropriate management is likely the only workable approach to combat the negative consequences of ecotourism.¹⁴ A Peruvian program designed to link ecotourism operations to conservation actions has employed this approach.¹⁵ Government support and initiatives may be needed to develop policies that curb the trajectory of negative consequences of ecotourism to the Pinatubo habitats. This warrants studies designed to identify causes and effects in order to develop programs to mitigate these outcomes.

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